



KUSKOKWIM RIVER CHINOOK SALMON STOCK STATUS AND DEVELOPMENT OF MANAGEMENT/ACTION PLAN OPTIONS

A Report to the Alaska Board of Fisheries

By:

Charlie Burkey Jr.
Michael Coffing
Douglas B. Molyneux
Paul Salomone

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AUTHORS

Charles Burkey Jr. is the Kuskokwim Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 1467, Bethel, AK 99559-1467; e-mail, charlie_burkey@fishgame.state.ak.us

Michael Coffing is the Western Region Subsistence Resource Specialist for the Alaska Department of Fish and Game, Division of Subsistence, P.O. Box 1788, Bethel, AK 99559-1788; e-mail, mike_coffing@fishgame.state.ak.us

Douglas B. Molyneaux is the Kuskokwim Area Research Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, 333 Raspberry Road, Anchorage, AK 99518-1599; e-mail, doug_molyneaux@fishgame.state.ak.us

Paul Salomone is the Kuskokwim Area Assistant Area Management Biologist for the Alaska Department of Fish and Game, Division of Commercial Fisheries, P.O. Box 1467, Bethel, AK 99559-1467; e-mail, paul_salomone@fishgame.state.ak.us

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SECTION I

KUSKOKWIM RIVER CHINOOK SALMON STOCK STATUS

Synopsis

In response to the guidelines established in the Sustainable Salmon Fisheries Policy, the Board of Fisheries classified Kuskokwim River chinook salmon stock as a yield concern during their September 2000 work session. A yield concern is the least severe of the three levels described in the policy. The Kuskokwim River chinook stock meets the definition of a yield concern based on the low commercial harvest levels that have occurred since 1996, and the anticipation of another year of low harvest in 2001. The poorer than expected 1998 run and the extremely poor runs in 1999 and 2000 were produced from good parent-year escapements. The anticipated poor run for 2001 will also be produced from good parent-year escapements.

Escapement

Spawning escapements for Kuskokwim River chinook salmon have been poor since 1998. The adequacy of spawning escapement assessment was limited in 1998 because of high water conditions, but it appears that desired escapement levels might not have been met in 1998. Desired escapement levels were definitely not achieved in 1999 and 2000, despite the use of specific management measures that limited harvest.

Chinook salmon escapement goals for the Kuskokwim River drainage are primarily based on the historic mean annual peak aerial survey counts for selected streams including: the Aniak, Salmon (Aniak), Holitna, Tuluksak, Kisaralik, Kwethluk, and Salmon (Pitka Fork) Rivers (Table 1). In addition, one escapement goal has also been established based on the historic mean annual counts through a weir on the Kogrukuk River. The Kuskokwim River chinook salmon escapement assessment index, which is a graphic tool that helps to distill the available chinook escapement data, also includes peak aerial survey counts from the Kipchuk, Holokuk, Oskawalik, Eek, and Cheeneetuk Rivers (Figures 2, Table 2). Recently developed enumeration projects on the Takotna, Tatlawiksuk, George and Kwethluk Rivers also support the assessment of poor escapements since 1998, although these new projects do not have formal escapement goals (Figure 3, Table 3).

Information from 1995, 1996, and 1997 indicate that spawning escapement goals were generally achieved in those years. Escapement in 1998 appeared poor, although our ability to assess escapements that year was severely hampered because of high water and adverse weather (Table 4). Escapement goals were not achieved in 1999 and 2000 despite the use of specific management actions that resulted in very low incidental commercial harvest levels in both years and subsistence fishing restrictions in 2000. In addition, a joint appeal was issued by ADF&G, U.S. Fish and Wildlife Service, the Association of Village Council Presidents, Kuskokwim Native Association, the Kuskokwim River Salmon Management Working Group, Tanana Chiefs Conference, and McGrath Native Village Council requesting subsistence fishers to conserve chinook salmon in 2000 because of the low run abundance.

1995

- Aerial Survey escapement goals generally achieved.
- Kogrukluk River escapement goal achieved.
- Parent-year escapements were good.

1996

- Aerial Survey escapement goals generally achieved.
- Kogrukluk River escapement goal achieved.
- Passage at Takotna River tower was poor, but passage at the George River Weir and Kwethluk River tower appeared good.
- Parent-year escapements were good to fair.

1997

- Aerial Survey escapement goals generally achieved.
- Kogrukluk River escapement goal achieved.
- Escapements at Takotna, George and Kwethluk Rivers appeared to be good.
- Parent-year escapements were fair.

1998

- Aerial Survey escapement goals generally not achieved.
- Kogrukluk River escapement goal probably achieved (minimal data).
- Data available from other projects is inadequate to make an assessment.
- Parent-year escapements were fair to good.

1999

- Aerial Survey escapement goals generally not achieved.
- Kogrukluk River escapement goal not achieved.
- Escapements at George and Tatlawiksuk Rivers appeared to be low.
- Specific management actions were taken to reduce commercial harvests.
- Parent-year escapements were good.

2000

- Aerial Survey escapement goals not achieved.
- Kogrukluk River escapement goal not achieved.
- Escapements at Takotna, Tatlawiksuk, George and Kwethluk Rivers all appeared to be low.
- Specific management actions were taken to reduce commercial and subsistence harvests.
- State, Federal, Native and local organizations issued a joint appeal for subsistence fishers to conserve chum salmon.
- Parent-year escapements were good.

Harvest

From 1960 to 1999 the total harvest of chinook salmon in the Kuskokwim River has ranged from 25,000 to 140,000 fish (Table 5). The ten-year average harvest is 108,000 chinook salmon. Total annual harvests have been below average since 1996. The total harvest has decreased to less than 80,000 chinook salmon during 1999. The Department anticipates that the 2000 total harvest will be below average as well.

The average annual subsistence harvest of chinook salmon from 1991 to 1995 was 86,000 fish (Figure 2, Table 5). The average annual harvest decreased to 79,000 fish during the period 1996 to 1999. Subsistence fishers reported adequate chinook salmon catches in 1997, 1998, and 1999. The 2000 subsistence salmon harvest data are not yet available; however, it was reported inseason that some subsistence fishers were not able to meet their harvest goals even after significantly increasing their fishing effort (Table 4). Some fishers also switched to smaller-mesh gillnets because of the poor catch in larger-mesh nets.

Average annual commercial harvests of chinook salmon, taken incidentally during the chum salmon directed fishery, have dropped from 47,000 fish for the years 1988 to 1992, to 12,000 fish during the period 1993 to 2000 (Figure 2, Table 5). The low harvests in 1993 and 1994 were because of harvest restrictions aimed at conserving chum salmon. The incidental chinook harvest increased in 1995, but the harvest decreased again in 1996 because of limited market interest in the targeted chum salmon (Table 4). In 1997 and 1998 chum salmon conservation was again the main issue that lead to low commercial chinook harvests, but concern was also beginning to develop regarding chinook salmon abundance particularly in 1998. In 1999 and 2000 the run strength of both chinook and chum salmon was poor; the start of the commercial chum salmon fishery was delayed until June 30 in 1999 and until July 5 in 2000, well past the 1985-1998 average start date of June 21 (Table 6). In both 1999 and 2000, Kuskokwim River commercial fishers were limited to one half-district period. The 2000 commercial harvest of 444 chinook salmon was the lowest harvest since 1960. The restrictive harvest measures taken in 1999 and 2000 were specifically designed to allow more chinook salmon to reach the spawning grounds and to provide protections to weak chum salmon runs; however, the resulting chinook and chum escapements were still poor. For the first time ever, subsistence fishing restrictions were imposed to conserve chinook salmon in 2000.

Chinook salmon harvests by sport fishers in the Kuskokwim River drainage are very low. The 10-year average annual sport-fish harvest is 800 chinook salmon (Table 5). Angler participation is approximately 5,000 angler days a year, across all fish species. The Aniak River supports the largest sport fishery in the Kuskokwim River with 3,500 angler days of effort. This sport fishery is characterized as having a high catch rate, but low harvest rate. On average anglers catch 4 to 6 thousand chinook salmon, but rarely harvest more than 500 chinook salmon. Chinook salmon are becoming increasingly important to the developing sport-fishing industry in the Kuskokwim River drainage.

1995

- Subsistence harvest of 96,436 fish was above average.
- Commercial harvest of 30,846 chinook salmon was above average.

1996

- Subsistence harvest of 78,063 fish was near average.
- Commercial harvest of 7,419 chinook salmon was the fourth lowest since 1960.

1997

- Subsistence harvest of 81,557 fish was near average.
- Commercial harvest of 10,441 chinook salmon was the sixth lowest since 1960.

1998

- Subsistence harvest of 81,265 fish was near average.
- Commercial harvest of 17,359 chinook salmon was below average.

1999

- Subsistence harvest of 73,194 fish was below average.
- Commercial harvest of 4,705 chinook salmon was the second lowest since 1960.

2000

- Commercial and sport harvest restrictions were enacted in early July.
- Specific management actions reduced subsistence harvest opportunity. Inseason reports by subsistence fishers indicate that some households were unable to achieve harvest goals despite increased effort.
- Commercial harvest of 444 chinook salmon is the lowest harvest since 1960.

Outlook

Typically, the majority of chinook salmon returning to the Kuskokwim River are age-5 and age-6. The 1995 and 1996 parent-year escapements that will likely produce the majority of the 2001 run were considered to be good, however the 2001 chinook run is anticipated to be critically low to below average in strength. The poor chinook salmon runs that have occurred in the Kuskokwim River since 1998 were produced from parent-year escapements that were considered adequate. Specifically, parent-year escapements that produced runs in 1998, 1999, and 2000 were all fair to good, but it appears that the production from these parent-year escapements was well below average. Causes for the drop in productivity are still largely unknown. Given the uncertainties associated with recent declines, it is unknown whether the 2001 chinook run will support any incidental commercial harvest, but staff are not optimistic. Furthermore, it is possible that the run may be so weak as to require reductions in subsistence harvest opportunity.

Table 1. Chinook salmon escapement data used in the Kuskokwim River chinook salmon escapement index, 1975 to 2000. Numbers are expressed as peak aerial survey counts^a, except for Kogruluk River weir which is expressed as total escapement.

Year	Eek	Kwethluk Canyon C.	Kisaralik	Tuluksak	Aniak	Kipchuk (Aniak)	Salmon (Aniak)	Holokuk	Oskawalik	Holitna	Kogruluk Weir	Cheeneetnuak	Salmon Pitka
1975			118			94		17	71	1,114			
1976				139		177		126	204	2,571	5,579	1,197	1,146
1977		2,290		291			562	60	276			1,399	1,978
1978	1,613	1,732	2,417	403			289			2,766	13,667	267	1,127
1979		911						113			11,338		699
1980	2,378			725			1,186	250	123				1,177
1981		1,783	672		9,074		894				16,655		1,474
1982	230				2,645		185	42	120	521	10,993		419
1983	188	471	731	129	1,909		231	33	52	1,069		243	586
1984		273	157	93	1,409					299	4,926	1,177	577
1985	1,118	629		135				135	61		4,619	1,002	625
1986					909		336	100		850	5,038	381	
1987	1,739	975		60		193	516	208	193	813		317	
1988	2,255	766	840	188	945		244	57	80		8,506		501
1989	1,042	1,157	152		1,880	994	631				11,940		446
1990	1,983	1,295	631	166	1,255	537	596	143	113		10,218		
1991	1,312	1,002		342	1,564	885	583				7,850		
1992					2,284	670	335	64	91	1,822	6,755	1,050	2,555
1993					2,687	1,248	1,082	114	103	1,573	12,332	678	1,012
1994		848	1,021		1,848	1,520	1,218				15,227	1,206	1,010
1995			1,243		3,174	1,215	1,442	181	289	2,787	20,630	1,565	1,911
1996					3,496		983	85			14,199		
1997			439	173	2,187	855	980	165	1,470	2,093	13,280	345	
1998		27	457		2,239	353							
1999								18	98	741	5,570		
2000					714	182	152	42	62	501	3,181		374
Escapement Goal ^b		1,200	1,000	400	1,500		600			2,000	10,000		1,300
Median ^c	1,460					670		107	108			1,002	

^a Estimates are from "peak" aerial surveys conducted between 20 and 31 July under fair, good, or excellent viewing conditions.

^b From Buklis (1993).

^c Median of years 1975 through 1994.

Table 2. Chinook salmon escapement index values used in the Kuskokwim River chinook salmon escapement index. Index values are expressed as a proportion of the escapement goal, or median historical escapement, achieved.

Year	Eek	Kwethluk Canyon C.	Kisaralik	Tuluksak	Aniak	Kipchuk (Aniak)	Salmon (Aniak)	Holokuk	Oskawalik	Holitna	Kogrukuk Weir	Cheeneetuk	Salmon Pitka	Annual Median	Annual Average	Count
1975			0.12			0.14		0.16	0.66	0.56				0.16	0.33	5
1976				0.35		0.26		1.18	1.89	1.29	0.56	1.19	0.88	1.03	0.95	8
1977		1.91		0.73			0.94	0.56	2.56			1.40	1.52	1.40	1.37	7
1978	1.10	1.44	2.42	1.01			0.48			1.38	1.37	0.27	0.87	1.10	1.15	9
1979		0.76						1.06			1.13		0.54	0.91	0.87	4
1980	1.63			1.81			1.98	2.34	1.14				0.91	1.72	1.63	6
1981		1.49	0.67		6.05		1.49				1.67		1.13	1.49	2.08	6
1982	0.16				1.76		0.31	0.39	1.11	0.26	1.10		0.32	0.36	0.68	8
1983	0.13	0.39	0.73	0.32	1.27		0.39	0.31	0.48	0.53		0.24	0.45	0.39	0.48	11
1984		0.23	0.16	0.23	0.91					0.15	0.49	1.17	0.44	0.34	0.48	8
1985	0.77	0.52		0.34				1.26	0.56		0.46	1.00	0.48	0.54	0.67	8
1986					0.61		0.56	0.93		0.13	0.50	0.38		0.53	0.57	6
1987	1.19	0.81		0.15		0.29	0.86	1.94	1.79	0.11		0.12		0.81	0.86	9
1988	1.54	0.64	0.84	0.47	0.63		0.41	0.53	0.74		0.85		0.39	0.63	0.70	10
1989	0.71	0.96	0.15		1.25	1.48	1.05				1.19		0.34	1.01	0.89	8
1990	1.36	1.08	0.63	0.42	0.84	0.80	0.99	1.34	1.05		1.02			1.01	0.95	10
1991	0.90	0.84		0.86	1.04	1.32	0.97				0.79			0.90	0.96	7
1992					1.52	1.00	0.56	0.60	0.84	0.91	0.68	1.05	1.97	0.91	1.01	9
1993					1.79	1.86	1.80	1.07	0.95	0.79	1.23	0.68	0.78	1.07	1.22	9
1994		0.71	1.02		1.23	2.27	2.03				1.52	1.20	0.78	1.22	1.35	8
1995			1.24		2.12	1.81	2.40	1.69	2.68	1.39	2.06	1.56	1.47	1.75	1.84	10
1996					2.33		1.64	0.79			1.42			1.53	1.55	4
1997			0.44	0.43	1.46	1.28	1.63	1.54	13.61	1.05	1.33	0.34		1.30	2.31	10
1998		0.02	0.46		1.49	0.53								0.49	0.62	4
1999								0.17	0.91	0.37	0.56			0.46	0.50	4
2000					0.48	0.27	0.25	0.39	0.57	0.25	0.32		0.29	0.30	0.35	8
Median	1.00	0.79	0.65	0.42	1.27	1.00	0.97	0.93	1.00	0.55	1.06	1.00	0.78			

Table 3. Historical salmon escapement data from selected Kuskokwim Area projects, 1976-2000.

Year	Operating Period	Chinook	Sockeye	Chum	Pink ^a	Coho
Kogrukuk River Weir						
BEG		10,000		30,000		25,000
1976	06/29 to 07/31	5,579	2,326	8,117	0 ^a	^b
1977	07/14 to 07/27	1,945 ^b	1,637 ^b	19,444	2	^b
1978	06/28 to 07/31	13,667	1,670	48,125	2	^b
1979	07/01 to 07/24	11,338	2,628	18,599	1	^b
1980	07/01 to 07/11	6,572 ^b	3,200 ^b	41,777	1	^b
1981	06/27 to 10/05	16,655	18,066	57,365	6	11,455
1982	07/09 to 09/14	10,993 ^b	17,297 ^b	64,077	19	37,796
1983	06/23 to 09/27	2,992 ^f	1,176 ^f	9,407 ^f	0	8,538
1984	06/19 to 09/15	4,928	4,133	41,484	0	27,595
1985	07/06 to 09/24	4,619	4,359	15,005	0	16,441
1986	06/29 to 09/07	5,038 ^b	4,244 ^b	14,693	0	22,506
1987	07/15 to 09/24	4,063 ^f	973 ^f	17,422 ^f	0	22,821
1988	07/05 to 09/17	8,505	4,397	39,540	0	13,512
1989	07/07 to 08/24	11,940 ^f	5,811 ^f	39,548	0	1272 ^b
1990	06/28 to 09/07	10,218	8,406	26,765	1	6,132 ^b
1991	07/04 to 09/15	7,850	16,455	24,188	4	9,933
1992	07/01 to 08/21	6,755	7,540	34,105	11	26,057 ^b
1993	07/02 to 09/06	12,332	29,358	31,899	0	20,517 ^b
1994	07/02 to 09/14	15,227	14,192 ^f	46,192 ^f	23	34,695
1995	07/02 to 09/06	20,630	10,996	31,265	2	27,861
1996	06/29 to 09/15	14,199	15,385	48,494	6	50,555
1997	06/28 to 09/21	13,286	13,078	7,937	0	12,237
1998	07/18 to 09/19	11,869 ^f	16,773 ^f	36,424 ^f	1	24,344
1999	07/01 to 09/20	5,570	5,864	13,810	0	12,609 ^f
2000	07/05 to 09/18	3,310	2,867	11,491	2	33,135
Aniak River Sonar						
BEG				250,000 ^c		
<i>Non user-configurable, one-bank expanded estimates 1980 - 1995</i>						
1980	06/22 to 07/30	56,469		1,169,470		
	08/16 to 09/12					81,556
1981	06/16 to 08/06	42,060		589,286		
1982	06/21 to 08/01	33,864		442,461		
1983	06/18 to 07/28	4,911		129,367		
1984	06/16 to 07/30			266,976		
1985	06/22 to 07/28			253,051		
1986	06/26 to 07/24			209,080		
1987	06/22 to 07/31			193,013		
1988	06/22 to 07/31			401,511		
1989	06/21 to 07/24			243,922		
1990	06/23 to 08/06			232,260		
1991	06/29 to 07/29			314,166		
1992	06/22 to 07/29			84,269		
1993	06/24 to 07/28			13,870		
1994	06/28 to 07/28			388,163		
1995	06/23 to 07/23					
<i>User-configurable, two-bank estimates, 1996-1999</i>						
BEG				250,000 ^c		
1996	06/21 to 07/28			302,106		
1997	06/16 to 08/03			262,522		
1998	06/24 to 07/31			279,430		
1999	07/01 to 08/03			177,771		
2000	06/25 to 07/31			144,157		

- continued -

Table 3. (2 of 2)

Year	Operating Period	Chinook	Sockeye	Chum	Pink	Coho
<u>Kwethluk River</u>						
<i>Weir</i>						
1992	06/18 to 09/12	9,675	1,316	30,596	45,952	45,605
<i>Tower</i>						
1996	06/22 to 07/27	7,415	1,801 ^b	26,049	2,899 ^b	180 ^b
1997	06/22 to 08/12	10,395	1,374	10,659	1,009 ^b	1,110 ^b
1998	07/24 to 08/18	120 ^b	120 ^b	720 ^b	4,398 ^b	2,367 ^b
1999	07/15 to 08/18	^b	^b	^b	^b	^b
<i>Weir Reinstalled</i>						
2000	6/15 to 9/15	3,547	358	12,382	1,407	25,610
<u>Tuluksak River Weir</u>						
1991	06/12 to 09/18	697	34	7,675	391	4,651
1992	06/24 to 09/10	1,083	129	11,183	2,458	7,501
1993	06/17 to 09/10	2,218	88	13,804	210	8,328
1994	06/29 to 09/11	2,922	94	15,707	3,450	8,213
<u>George River Weir</u>						
1996	06/21 to 07/26	7,487	98	17,570	644 ^b	^b
1997	06/09 to 09/15	7,820	445	5,941	17	8,937
1998	06/22 to 07/07	^b	^b	^b	^b	^b
1999	07/14 to 09/25	3,548	39	11,682	97	8,930
2000	06/17 to 09/16	2,959	23	3,488	61	11,256
<u>Takotna River Tower</u>						
<i>Tower</i>						
1995	07/07 to 07/31	^b	0	1,685 ^b	0	0 ^b
1996	06/15 to 07/26	401	0	2,794	0	0 ^b
1997	06/15 to 07/26	1,176	0	1,794		
1998	06/20 to 07/07	^b	^b	^b	^b	^b
1999	Not Operational					
<i>Weir</i>						
2000	06/24 to 09/20	345	4	1,254	0	3,957
<u>Tatlawiksuk River Weir</u>						
1998	06/18 to 07/07	^b	^b	^b	^b	^b
1999	06/15 to 09/20	1,494	5	9,656	1	3,464
2000	06/15 to 08/13	810	0	6,965	0	24,000 ^f

^a Pink salmon can pass freely through the Kogrukluk River weir.

^b No counts or incomplete count as project was not operated during a significant portion of the species' migration.

^c Aniak River sonar counts after 1983 represent multiple species, however, chum salmon are assumed to be the dominant species during the operational period.

^d Reliable escapement estimates are not available from Aniak River sonar for 1995.

^e The original Aniak River sonar BEG of 250,000 fish counts has been carried forward to the user configurable project, but the BEG will be reassessed as more information is gathered.

^f Field operations were incomplete; full season fish passage was estimated.

^g Weir picket spacing allows pink salmon to pass uncounted.

Table 4. Historic events that have potential or actual influence on the commercial salmon fisheries of the Kuskokwim Area.

YEAR	EVENT ^a
1995	<ul style="list-style-type: none"> • BSFA operates a chum salmon radio telemetry project on the Kuskokwim River. • Takotna Community School operates a salmon counting tower on the Takotna River (1995-1998). • AVCP and BSFA operate the Lower Kuskokwim test fishery in cooperation with the department; the project is a modification of the Eek test fishery.
1996	<ul style="list-style-type: none"> • ADF&G genetic sampling for late spawning chum salmon and one mixed stock sample from District 1. • Near record low water levels on the Kuskokwim River during June and early August coupled with record high water temperatures. • Irregular fishing schedule in District 1 during June and July due to limited market interest for chum salmon. • Record early coho run coupled with record high harvest and escapement at Kogrukuk River. • AVCP operates a salmon counting tower on the Kwethluk River (1996-1999). • KNA operates a salmon weir on the George River (1996-present). • Aniak River sonar is relocated to allow for full channel ensonification and configurable sonar technology is employed (1996-present).
1997	<ul style="list-style-type: none"> • Kuskokwim River declared an economic disaster area due to very low chum and coho salmon returns, harvests and exvessel prices. Northern boundary of District 4 moved 3 miles south from July 14 to July 28. Record low chum salmon escapement at Kogrukuk River weir. • Aniak chum salmon return vastly exceeded expectations based on 1992-1993 spawning abundance estimates. • Due to an extremely low return of chum salmon, ADF&G, AVCP, KNA, KRSMWG, ONC, TCC and McGrath Native Council issue a joint appeal for subsistence users to conserve chum salmon. Record low subsistence harvest of chum salmon in the Kuskokwim Area. • Aniak processor does not operate due to depressed salmon market (1997-present) • Sale of salmon roe is prohibited in Districts 1 and 2 (effective beginning December 1997).
1998	<ul style="list-style-type: none"> • Kuskokwim River declared an economic disaster area for second straight year due to low chum and coho salmon returns, harvests and exvessel prices. • KNA operates a salmon weir on the Tatlawiksuk River (1998-present). • High water levels severely restrict operational period of many Kuskokwim Area escapement projects
1999	<ul style="list-style-type: none"> • Kuskokwim River experiences extremely low chum and coho salmon returns, harvests and exvessel prices for third consecutive year. Chinook salmon returns are also low and all species have very late run timing. Kuskokwim Bay coho returns and harvests extremely low. • Federal government assumes control of subsistence fishery management in federal waters on October 1. • KNA-operated salmon weirs on the Tatlawiksuk and George Rivers converted to resistance board (floating) weirs and operations extended through coho run. • Kuskokwim River sonar project begins redevelopment using split-beam sonar and is relocated to a new site one mile above upstream end of Church Slough.
2000	<ul style="list-style-type: none"> • Kuskokwim River declared an economic disaster area due to extremely low chum salmon return, harvest and exvessel price. Chinook salmon returns are very low for second consecutive year. Many subsistence fishers report that they were unable to meet their chinook and chum salmon harvest goals. • Due to an extremely low return of chinook salmon, ADF&G, AVCP, KNA, KRSMWG, Kwethluk IRA, TCC, McGrath Native Council and USF&WS issue a joint appeal for subsistence users to conserve chinook salmon. • Takotna Community Schools operates a resistance board weir on the Takotna River • Kwethluk IRA and USF&WS operates a resistance board weir on the Kwethluk River • District W-1 divided into Subdistricts W-1A (above Bethel) and W-1B (below Bethel) and fishers are required to register to fish in only one subdistrict. Only one subdistrict is opened at a time to reduce harvest due to limited processing capacity.

^a For additional information on specific topics refer to the Region III Report Catalog or historical Area Management Reports for the Kuskokwim Area.

Table 5. Utilization of chinook salmon in the Kuskokwim River, 1960-2000.

Year	Commercial Harvest ^a	Subsistence Harvest ^b	Sport Harvest ^c	Test Fishery Harvest	Total Utilization	10-Year Average
1960	5,969	18,887			24,856	
1961	18,918	28,934			47,852	
1962	15,341	13,582			28,923	
1963	12,016	34,482			46,498	
1964	17,149	29,017			46,166	
1965	21,989	24,697			46,686	
1966	25,545	49,325		285	75,155	
1967	29,986	59,913		766	90,665	
1968	34,278	32,942		608	67,828	
1969	43,997	40,617		833	85,447	56,008
1970	39,290	69,612		857	109,759	64,498
1971	40,274	43,242		756	84,272	68,140
1972	39,454	40,396		756	80,606	73,308
1973	32,838	39,093		577	72,508	75,909
1974	18,664	27,139		1,236	47,039	75,997
1975	22,135	48,448		704	71,287	78,457
1976	30,735	58,606		1,206	90,547	79,996
1977	35,830	56,580	33	1,264	93,707	80,300
1978	45,641	36,270	116	1,445	83,472	81,864
1979	38,966	56,283	74	979	96,302	82,950
1980	35,881	59,892	162	1,033	96,968	81,671
1981	47,663	61,329	189	1,218	110,399	84,284
1982	48,234	58,018	207	542	107,001	86,923
1983	33,174	47,412	420	1,139	82,145	87,887
1984	31,742	56,930	273	231	89,176	92,100
1985	37,889	43,874	85	79	81,927	93,164
1986	19,414	51,019	49	130	70,612	91,171
1987	36,179	67,325	355	384	104,243	92,225
1988	55,716	70,943 ^c	528	576	127,763	96,654
1989	43,217	81,176	1,218	543	126,154	99,639
1990	53,504	85,979	394	512	140,389	103,981
1991	37,778	85,554	401	117	123,850	105,326
1992	46,872	64,795	367	1,380	113,414	105,967
1993	8,735	87,512	587	2,483	99,317	107,685
1994	16,211	93,242	1,139	1,937	112,529	110,020
1995	30,846	96,436	541	1,421	129,244	114,752
1996	7,419	78,063	1,432	247	87,161	116,406
1997	10,441	81,577	1,615	332	93,965	115,379
1998	17,359	81,265	1,434	210	100,268	112,629
1999	4,705	73,194 ^d	252	98	78,249	107,839
2000	444			64		
10-Yr. Ave.						
(1990-1999)	23,387	82,762	816	874	107,839	

^a Districts 1 and 2, also includes harvests in District 3 from 1960 to 1965.^b Estimated subsistence harvest expanded from villages surveyed.^c Beginning in 1988, estimates are based on a new formula so data since 1988 is not comparable with previous years.^d 2000 subsistence harvest data not available^e Sport Fish Statewide Harvest Survey 1977-1999.

Table 6. (page 2 of 2)

Year	Date		Number of Permits	Hours Fished	Permit Hours	Chinook		Sockeye		Chum		Coho	
						Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1997	Jun	23	353	6	2,118	10,023	4.73	21,218	10.02	13,090	6.18		
	Jul	31	429	6	2,574	141	0.05	352	0.14	2,060	0.80	14,963	5.81
	Aug	06	513	6	3,078	145	0.05	229	0.07	1,387	0.45	37,216	12.09
	Aug	12	509	6	3,042	61	0.02	122	0.04	408	0.13	56,149	18.46
	Aug	18	478	6	2,850	66	0.02	67	0.02	58	0.02	21,273	7.46
Total			607	30.0	13,662	10,436		21,988		17,003		129,601	
1998	Jun	24	338	6	2,028	6,413	3.16	9,043	4.46	32,467	16.01		
	Jun	29	426	6	2,556	6,358	2.49	22,506	8.81	66,789	26.13		
	Jul	03	445	4	1,780	2,277	1.28	15,985	8.98	51,471	28.92	1	0.00
	Jul	11	417	4	1,668	1,127	0.68	10,172	6.10	29,407	17.63	23	0.01
	Jul	22	346	6	2,076	460	0.22	1,538	0.74	15,663	7.54	3,633	1.75
	Jul	27	370	6	2,220	356	0.16	932	0.42	7,500	3.38	18,497	8.33
	Aug	01	425	6	2,550	156	0.06	235	0.09	2,787	1.09	26,791	10.51
	Aug	06	496	6	2,976	88	0.03	295	0.10	1,020	0.34	45,128	15.16
	Aug	11	464	6	2,784	67	0.02	95	0.03	388	0.14	58,426	20.99
	Aug	17	439	6	2,634	34	0.01	45	0.02	122	0.05	34,640	13.15
	Aug	22	382	6	2,292	19	0.01	53	0.02	67	0.03	18,936	8.26
	Aug	29	154	6	924	1	0.00	7	0.01	17	0.02	4,093	4.43
Total			615	68	26,488	17,356		60,906		207,698		210,168	
1999	Jun	30	409	6	2,454	4,668	1.90	16,772	6.83	22,700	9.25		
	Aug	7	389	6	2,334	37	0.02	204	0.09	306	0.13	23,593	10.1
Total			509	12	4,788	4,705		16,976		23,006		23,593	
2000													
	July	5	224	4	896	357	0.40	3,658	4.1	11,026	12.3		
	Aug	1	248	6	1,488	12	0.01	94	0.1	156	0.1	25,642	17.2
	Aug	4	123	6	738	7	0.01	7	0.0	53	0.1	50,260	68.1
	Aug	5	270	6	1,620	8	0.00	73	0.0	43	0.0	32,056	19.8
	Aug	8	186	6	1,116	9	0.01	26	0.0	55	0.0	26,771	24.0
	Aug	9	217	6	1,302	13	0.01	57	0.0	128	0.1	20,905	16.1
	Aug	12	189	6	1,134	12	0.01	17	0.0	23	0.0	37,451	33.0
	Aug	14	224	6	1,344	6	0.00	75	0.1	33	0.0	16,766	12.5
	Aug	14	193	6	1,158	5	0.00	23	0.0	15	0.0	17,916	15.5
	Aug	18	199	6	1,194	6	0.01	58	0.0	16	0.0	14,697	12.3
	Aug	21	158	6	948	4	0.00	3	0.0	10	0.0	8,577	9.0
	Aug	22	143	6	858	1	0.00	32	0.0	4	0.0	4,489	5.2
	Aug	25	106	6	636	4	0.01	7	0.0	8	0.0	4,191	6.6
Total			532	76.0	14,432.0	444.0		4,130.0		11,570.0		259,721.0	

Table 6. Historical commercial salmon catches by fishing period in Kuskokwim Area District 1, 1994-2000.

Year	Date	Number of Permits	Hours Fished	Permit Hours	Chinook		Sockeye		Chum		Coho	
					Catch	CPUE	Catch	CPUE	Catch	CPUE	Catch	CPUE
1994	Jun 24	576	8	4,608	14,221	3.09	38,958	8.45	87,214	18.93	0	0.00
	Jul 14	496	4	1,984	578	0.29	3,891	1.96	43,585	21.97	820	0.41
	Jul 19	500	6	3,000	441	0.15	4,475	1.49	60,104	20.03	7,027	2.34
	Jul 23	506	6	3,036	313	0.10	1,125	0.37	38,149	12.57	24,213	7.98
	Jul 26	552	6	3,312	225	0.09	471	0.14	22,460	6.78	39,901	12.05
	Jul 29	577	6	3,462	204	0.06	159	0.05	11,252	3.25	52,090	15.05
	Aug 04	606	6	3,636	88	0.06	87	0.02	3,983	1.10	75,514	20.77
	Aug 09	530	6	3,180	29	0.03	70	0.02	1,153	0.36	129,570	40.75
	Aug 12	606	8	4,848	34	0.01	47	0.01	777	0.16	117,753	24.29
	Aug 15	595	8	4,760	22	0.01	33	0.01	321	0.07	47,902	10.06
	Aug 18	598	8	4,784	20	0.00	16	0.00	212	0.04	82,750	17.30
	Aug 22	554	8	4,432	12	0.00	15	0.00	104	0.02	44,054	9.94
	Aug 25	447	8	3,576	9	0.00	7	0.00	63	0.02	37,595	10.51
	Aug 27	445	6	2,670	3	0.00	4	0.00	30	0.01	20,526	7.69
	Aug 30	263	6	1,578	2	0.00	2	0.00	16	0.01	8,192	5.19
	Sept 02	157	6	942			2	0.00	3	0.00	2,489	2.64
Total		706	106	53,808	16,201		49,362		269,426		690,396	
1995	Jun 22	569	4	2,276	6,895	3.03	4,420	1.94	49,157	21.60	0	0.00
	Jun 26	568	4	2,272	9,452	4.16	19,449	8.56	93,152	41.00	0	0.00
	Jun 29	565	4	2,260	4,972	2.20	18,188	8.05	83,580	36.98	0	0.00
	Jul 03	475	4	1,900	2,847	1.50	17,078	8.99	89,427	47.07	0	0.00
	Jul 06	481	4	1,924	1,521	0.79	14,765	7.67	81,246	42.23	0	0.00
	Jul 10	494	4	1,976	906	0.46	7,100	3.59	86,368	43.71	21	0.01
	Jul 14	435	4	1,740	546	0.31	4,219	2.42	43,137	24.79	221	0.13
	Jul 18	336	6	2,016	366	0.18	2,482	1.23	37,294	18.50	671	0.33
	Jul 21	368	4	1,472	202	0.14	940	0.64	21,039	14.29	1,272	0.86
	Aug 04	234	6	1,404	64	0.05	123	0.09	1,072	0.76	48,665	34.66
	Aug 08	611	6	3,666	95	0.03	363	0.10	1,229	0.34	98,548	26.88
	Aug 12	617	6	3,702	50	0.01	359	0.10	899	0.24	102,421	27.67
	Aug 16	593	6	3,558	52	0.01	147	0.04	208	0.06	65,713	18.47
	Aug 19	555	6	3,330	28	0.01	87	0.03	133	0.04	41,057	12.33
	Aug 22	497	6	2,982	16	0.01	113	0.04	157	0.05	43,978	14.75
	Aug 26	477	6	2,862	25	0.01	117	0.04	101	0.04	29,129	10.18
	Aug 29	355	6	2,130	15	0.01	45	0.02	39	0.02	17,790	8.35
	Sept 01	219	6	1,314	2	0.00	31	0.02	12	0.01	5,783	4.40
Total		712	92	42,784	28,054		90,026		588,250		455,269	
1996	Jun 17	245	2	490	2,045	4.17	1,850	3.78	11,560	23.59	0	0.00
	Jun 20	283	2	566	2,046	3.61	6,423	11.35	27,442	48.48	0	0.00
	Jun 24	240	1.5	360	666	1.85	4,420	12.28	19,438	53.99	0	0.00
	Jul 02	224	2	448	545	1.22	3,962	8.84	20,915	46.69	0	0.00
	Jul 05	194	2	388	316	0.81	3,481	8.97	17,651	45.49	2	0.01
	Jul 08	211	2	422	178	0.42	6,795	16.10	18,801	44.55	24	0.06
	Jul 12	237	2	474	230	0.49	3,781	7.98	26,468	55.84	1,608	3.39
	Jul 16	197	2	394	87	0.22	602	1.53	15,192	38.56	4,675	11.87
	Jul 19	267	3	801	164	0.20	298	0.37	13,390	16.72	14,746	18.41
	Jul 22	417	6	2,502	183	0.07	639	0.26	14,504	5.80	50,443	20.16
	Jul 25	487	8	3,896	124	0.03	256	0.07	9,024	2.32	113,637	29.17
	Jul 29	526	6	3,156	97	0.03	186	0.06	3,828	1.21	144,773	45.87
	Jul 31	464	6	2,784	52	0.02	92	0.03	1,541	0.55	122,946	44.16
	Aug 03	541	6	3,246	59	0.02	129	0.04	1,097	0.34	132,540	40.83
	Aug 07	514	6	3,084	43	0.01	73	0.02	581	0.19	94,332	30.59
	Aug 10	502	6	3,012	45	0.01	60	0.02	797	0.26	83,653	27.77
	Aug 13	471	6	2,826	25	0.01	82	0.03	296	0.10	70,053	24.79
	Aug 16	459	6	2,754	28	0.01	147	0.05	215	0.08	49,012	17.80
	Aug 20	400	6	2,400	19	0.01	83	0.03	51	0.02	25,870	10.78
	Aug 23	293	6	1,758	9	0.01	22	0.01	23	0.01	13,133	7.47
	Aug 26	209	6	1,254	11	0.01	23	0.02	13	0.01	8,684	6.93
Total		620	92.5	37,015	6,972		33,404		202,827		930,131	

-continued-

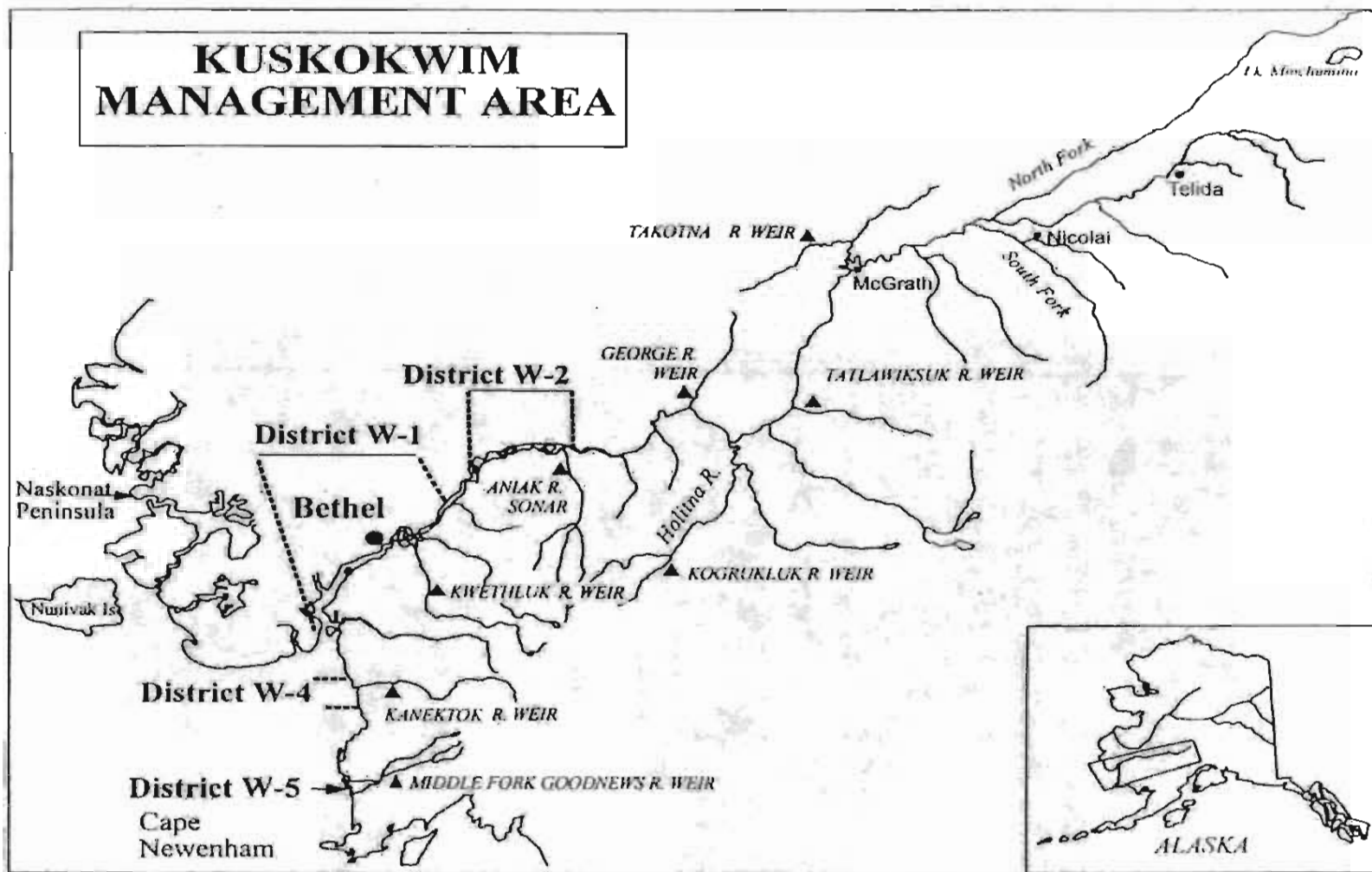


Figure 1. Kuskokwim Salmon Management Area.

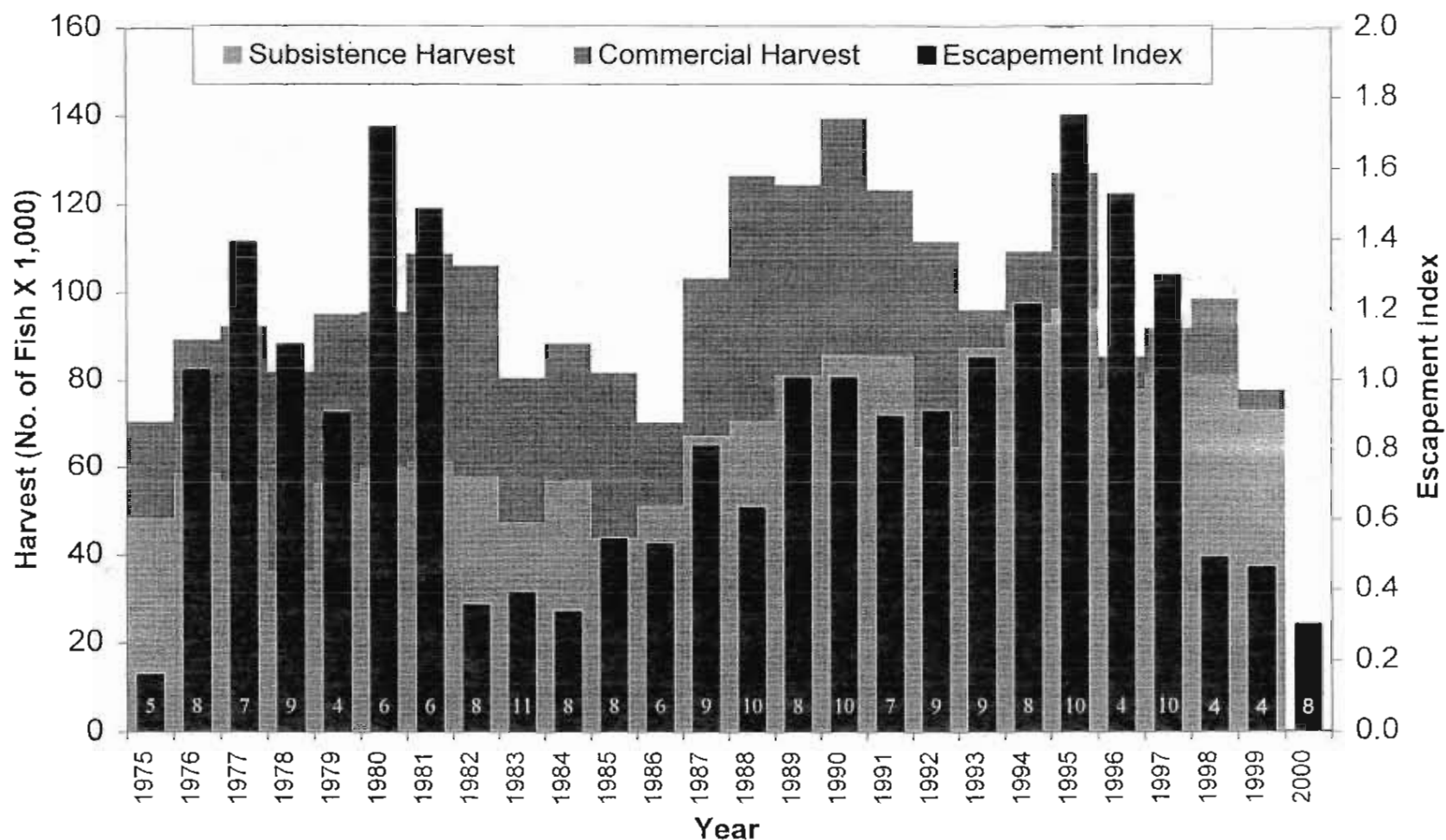


Figure 2. Historic Kuskokwim River chinook salmon harvest and escapement trends. The annual subsistence and commercial harvests are depicted as stacked bars and measured in thousands of fish. The escapement index represents the relative escapement of 13 possible index streams. Each escapement index bar represents the median escapement level achieved in that year over all index streams surveyed, expressed as the proportion of the escapement goal, or median historical escapement. The number at the base of each bar indicates the number of index streams included for that year.

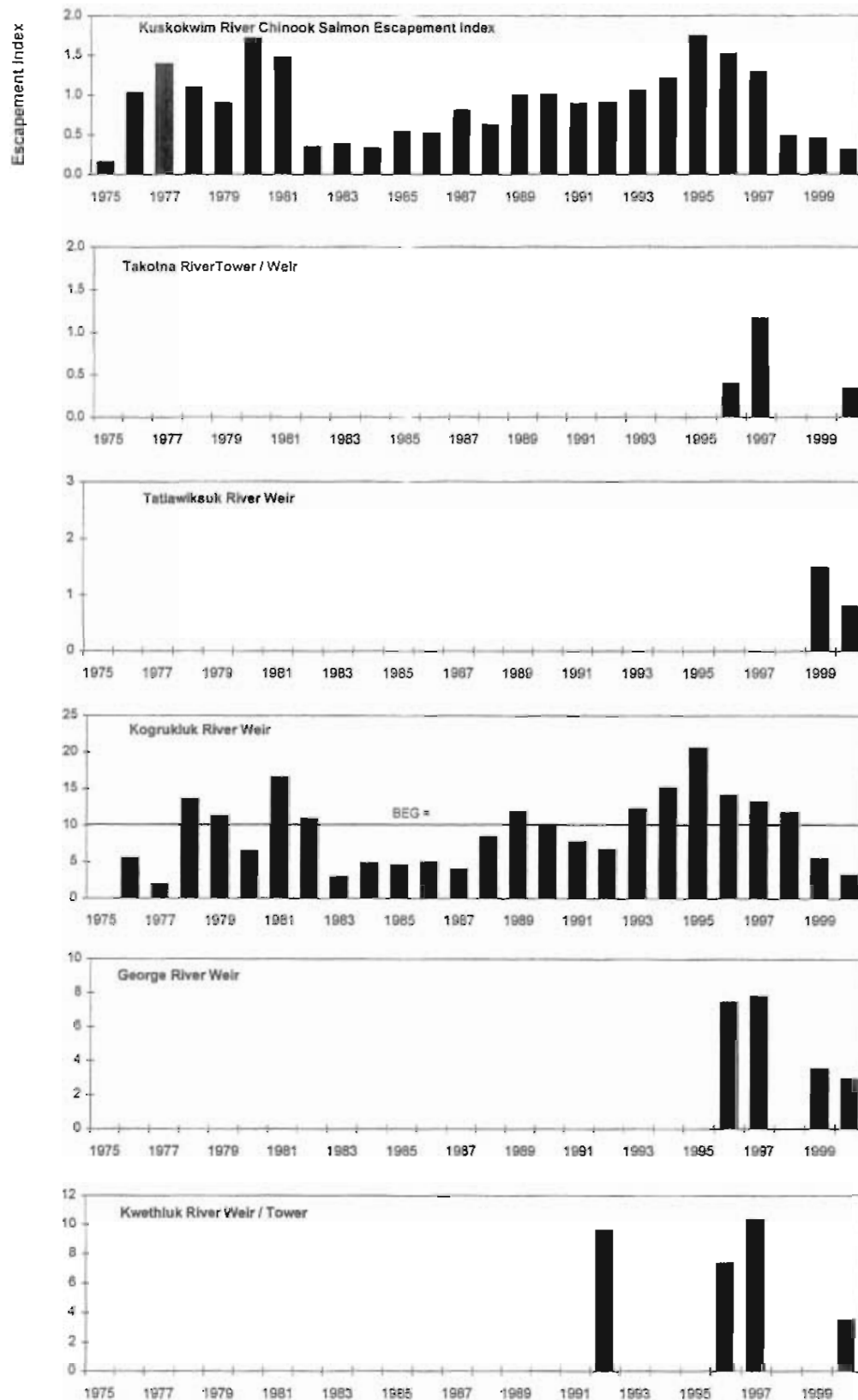


Figure 3. Historic Kuskokwim River chinook salmon escapements by project.

SECTION II

DEVELOPMENT OF MANAGEMENT / ACTION PLAN OPTIONS FOR KUSKOKWIM RIVER CHINOOK SALMON STOCK OF CONCERN AS OUTLINED IN THE SUSTAINABLE FISHERIES POLICY

SECTION II

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SECTION II

KUSKOKWIM RIVER CHINOOK SALMON MANAGEMENT/ACTION PLAN REVIEW AND DEVELOPMENT

Current Stock Status

In response to the guidelines established in the Sustainable Salmon Fisheries Policy, the Board of Fisheries classified the Kuskokwim River chinook salmon stock as a yield concern during the September 28-29, 2000 work session. This determination was based on the inability, despite the use of specific management measures, to maintain expected yields, or harvestable surpluses, above the stock's escapement needs since 1998 and the anticipated low harvest level in 2001.

C&T Use Finding and the Amount Necessary for Subsistence

The Board of Fisheries made a positive finding for Customary and Traditional Use for all salmon in the entire Kuskokwim Area in 1993. The amounts necessary for subsistence (ANS) has been determined to be 192,000 – 242,000 salmon (all species combined). This ANS finding was based on subsistence salmon harvests from 1982 through 1991.

Revision of Amount Necessary for Subsistence

The department recommends that the Board amend 5 AAC 01.236 to include a revised finding of the ANS for the stock of concern using updated subsistence harvest data. In establishing the ANS range, the Board should use harvest information that represents the pattern of use in the subsistence fishery. One approach that may capture the dynamic pattern of use within the recent decade is to use the low and mean subsistence harvests for the most recent ten years, rounded down to the nearest 500 fish for the low, and rounded up to the nearest 500 fish for the high. The Board may also consider amending 5 AAC 01.236 to include an ANS finding by species, and/or by district or district groups.

Objectives

The objective of this recommendation is to reevaluate the previous Board's ANS finding in the Kuskokwim Area using more complete and accurate data, which better represents the pattern of use in the subsistence fishery.

Options for defining the Amount Necessary for Subsistence range

In amending 5 AAC 01.236 to redefine the ANS range for the stock of concern, the following options may be considered:

ANS Options Decision Matrix

Option	ANS by Combined Species	ANS by Individual Species	ANS by Region	ANS by District or District Groupings
A	x			
B	x		x	
C	x			x
D	x	x	x	
E		x	x	
F		x		x

Option A

Status Quo. The current ANS range (192,000 – 242,000 salmon) is not amended.

The Department does not recommend this option. The current ANS finding is for the entire Kuskokwim Management Area, which includes the Kuskokwim River drainage, Kuskokwim Bay, and the Bering Sea coast. The yield concern finding that the Board of Fisheries made at its September 28-29, 2000 work session was specifically for Kuskokwim River chinook. Amending the current ANS would be more appropriate since management options are directed primarily at rebuilding Kuskokwim River salmon stocks. In addition, the department revised the subsistence harvest survey methodology starting in 1989. The revised methodology resulted in a more complete reporting of subsistence harvests and a more accurate estimation of the total subsistence salmon harvest for the Kuskokwim Area.

(The following table is used to calculate ANS range for all options)

Kuskokwim Area Subsistence Salmon Harvests, 1990-99.

		District 1 Lower River	District 2 Middle River	Upper River Above District 2	District 2 And Upper River	District 4 Quinhagak	District 5 Goodnews/ Platinum	All Kuskokwim River	All Non Kuskokwim River	Total Kuskokwim Area
Chinook	Max 1990-99	78,956	12,754	4,750	17,480	6,013	917	96,436	6,699	100,159
Chinook	Min 1990-99	52,795	7,181	3,082	10,263	2,746	374	64,795	3,535	68,686
Chinook	Mean 1990-99	69,207	9,357	4,197	13,554	3,698	666	82,762	4,511	87,272
Sockeye	Max 1990-99	42,883	5,089	7,445	12,534	1,951	1,282	52,984	3,420	56,404
Sockeye	Min 1990-99	21,671	2,183	3,121	5,572	400	253	27,791	823	28,622
Sockeye	Mean 1990-99	30,733	3,315	5,156	8,471	1,173	750	39,204	2,073	41,276
Coho	Max 1990-99	43,362	4,448	7,112	10,295	4,174	1,828	50,370	5,922	55,620
Coho	Min 1990-99	18,979	2,010	2,976	4,986	1,264	305	24,864	1,682	27,239
Coho	Mean 1990-99	26,725	2,926	5,153	8,079	2,427	853	34,803	3,416	38,220
Chum	Max 1990-99	93,743	19,132	13,633	32,765	3,234	1,006	126,508	4,961	131,469
Chum	Min 1990-99	32,790	3,916	2,297	7,001	600	133	39,970	1,006	40,976
Chum	Mean 1990-99	58,001	10,304	6,837	17,142	1,459	325	75,143	3,004	78,147
All species	Max 1990-99	233,946	34,691	30,583	65,274	15,372	4,176	293,554	20,968	314,522
All species	Min 1990-99	153,722	16,097	15,202	31,299	5,853	1,404	188,476	7,588	198,466
All species	Mean 1990-99	184,667	25,902	21,343	47,245	8,757	2,594	231,912	13,003	244,915

Source: Annual harvest surveys and permits, ADF&G

Option B

Establish the ANS range for all species combined for the Kuskokwim River drainage, and for the remainder of the Kuskokwim Area using more recent and complete subsistence harvest data.

- I. Kuskokwim River drainage: 188,000 – 232,000
- II. Remainder of Kuskokwim Area: 7,500 – 13,500

Option C

Establish the ANS range for all species combined by district or district groupings within the Kuskokwim River and Kuskokwim Area.

- I. District 1 (Lower Kuskokwim River): 153,500 – 185,000
- II. District 2, and Upper Kuskokwim River drainage: 31,000 – 47,500
- III. District 4: 5,500 – 9,000
- IV. District 5: 1,000 – 3,000

Option D

Establish the ANS range by species for the Kuskokwim River drainage and establish the ANS for combined species for the remainder of the Kuskokwim Area.

- I. Kuskokwim River drainage
 - Chinook salmon: 64,500 – 83,000
 - Sockeye salmon: 27,500 – 39,500
 - Coho salmon: 24,500 – 35,000
 - Chum salmon: 39,500 – 75,500
- II. Remainder of Kuskokwim Area
 - All salmon: 7,500 – 13,500

Option E

Establish the ANS range by species for the Kuskokwim River drainage, and for the remainder of the Kuskokwim Area using more recent and complete subsistence harvest data.

- I. Kuskokwim River drainage
 - Chinook salmon: 64,500 – 83,000
 - Sockeye salmon: 27,500 – 39,500
 - Coho salmon: 24,500 – 35,000
 - Chum salmon: 39,500 – 75,500
- II. Remainder of Kuskokwim Area
 - Chinook salmon: 3,500 – 5,000
 - Sockeye salmon: 500 – 2,500
 - Coho salmon: 1,500 – 3,500
 - Chum salmon: 1,000 – 3,500

Option F

Establish the ANS range by species and by district or district groupings within the Kuskokwim River and Kuskokwim Area.

- I. District 1 (Lower Kuskokwim River)
 - Chinook salmon: 52,500 – 69,500
 - Sockeye salmon: 21,500 – 31,000
 - Coho salmon: 18,500 – 27,000
 - Chum salmon: 32,500 – 58,500
- II. District 2, and Upper Kuskokwim River drainage
 - Chinook salmon: 10,000 – 14,000
 - Sockeye salmon: 5,500 – 8,500
 - Coho salmon: 4,500 – 8,500
 - Chum salmon: 7,000 – 17,500
- III. District 4
 - Chinook salmon: 2,500 – 4,000
 - Sockeye salmon: 400 – 1,500
 - Coho salmon: 1,000 – 2,500
 - Chum salmon: 500 – 1,500
- IV. District 5
 - Chinook salmon: 374 – 1,000
 - Sockeye salmon: 253 – 1,000
 - Coho salmon: 305 – 1,000
 - Chum salmon: 133 – 500

Benefits

All Options: If the postseason subsistence harvest surveys indicate that subsistence harvests were above the lower end of the ANS range, it is likely that there was a reasonable opportunity for subsistence uses. In contrast, if subsistence harvests were below the ANS range, this may indicate there might not have been a reasonable opportunity for subsistence uses. A chronic inability of harvests to meet the ANS range may trigger a Tier II situation. So, in essence, the ANS is a performance measure.

Options B and C: An ANS range for all species combined provides a simple, although gross, measure of the degree that subsistence opportunity for harvesting salmon was provided. Combining species also takes into account the interchangeable nature of certain subsistence resources.

Options D and E: An ANS range by species for only the Kuskokwim River drainage would allow for management actions that are focused on specific Kuskokwim River stocks of concern while not involving other areas without stocks of concern. For example, a Tier II permit system might be established within the Kuskokwim River drainage with chronically depressed harvests, while leaving management in the remainder of the Kuskokwim Area where the Board has not yet found a concern on a Tier I system.

Options C and F: An ANS range limited to a district or district grouping allows for more discrete management actions within that district or district grouping, without involving other areas where there may or may not be management problems. For instance, a Tier II permit system might be established within one district with chronically depressed harvests, while leaving harvests in other districts without similar problems on a Tier I

system. Grouping Districts 2 and the Upriver areas of the Kuskokwim drainage reflects the shared gear and harvest patterns in these districts.

Options D, E and F: An ANS range specific to the stock of concern provides an index for measuring the extent to which reasonable opportunity was provided in the subsistence fishery, using postseason harvest data.

Detriments

All Options: If the ANS range is not set to accurately reflect the normal between-year fluctuations in subsistence uses, a Tier II fishery may be unnecessarily triggered, reducing subsistence opportunity for subsistence users.

Options A, B, C: An ANS finding for all salmon grouped together may not allow for measuring effects on reasonable opportunity of management actions directed toward a specific stock of concern. Reasonable opportunity of subsistence uses would continue to be measured by harvests of a mixed set of species. To a certain extent, increased opportunity for one species can compensate for reduced opportunity for another species. However, they are not fully interchangeable. For example, some subsistence fishers may be able to substitute sockeye salmon for reduced catches of chinook salmon, primarily because sockeye salmon can be harvested during June when favorable drying conditions exist. However, lack of opportunity to harvest chinook salmon can not be remedied simply with additional opportunity to take coho salmon. Coho salmon can not be dried and smoked like chinook salmon because late July and August are typically too rainy and cool. Freezing and canning are typically used to preserve coho salmon. Most households do not have enough freezer capacity to store sufficient quantities of coho salmon to replace dried and smoked chinook salmon.

Options B, D and E: The remainder of the Kuskokwim Management Area outside of the Kuskokwim River drainage is large and includes salmon stocks bound for specific drainages such as the Kanektok River, Goodnews River, and spawning areas outside of the Kuskokwim Area. Combining all of these stocks into one ANS may not be desirable. However, there does not appear to be a specific need to more discreetly define the ANS finding for this area at this time.

Options C and F: Although the ranges are not designed for inseason management, establishing ANS by district or district groupings may create unrealistic management goals because the subsistence harvest is unknown inseason. The department cannot manage for a specific harvest level by district inseason. Measurement of success of meeting management objectives within a district can only be accomplished using postseason harvest assessments.

Preferred Option

Option D: The department prefers that the Board establish an ANS range by species for the entire Kuskokwim River drainage and an ANS range by combined species for the remainder of the Kuskokwim Area using the low and the mean subsistence harvests for the most recent ten years.

Establishing an ANS range for the entire river is less complicated than the other options. The lack of complete and timely inseason reporting of subsistence harvests makes it difficult for the department to manage for an ANS range by district as the fishery is prosecuted. In the absence of commercial fishing, the Kuskokwim River district boundaries that were established for commercial fishing have little application for subsistence guidelines. Establishing the ANS range for combined species for the remainder of the Kuskokwim Area provides a measure of subsistence opportunity for stocks outside of the Kuskokwim River drainage.

Habitat Factors Adversely Affecting the Stock

Mining

Based on Habitat and Restoration Division's experience in the Kuskokwim River drainage over the last 20 years there has been fisheries habitat damage in the drainage, primarily from gold mining activities occurring over the last century (Lance Trasky and Wayne Dolezal, ADF&G, Anchorage, personal communication). This activity probably has reduced the ability of the drainage to produce salmon. The division's evaluation is based on review of individual projects and on an extensive stream survey of south side tributaries between Stony River and the Aniak River in the 1980's. Depending upon the drainage the relative level of damage ranges from severe to low to unknown. Affected drainages include:

Kwethluk River: Supports spawning populations of chinook, chum, coho, pink, and sockeye salmon. Impacts from gold mining have occurred in some upper tributaries. Effect on salmon spawning and rearing habitat unknown.

Kisaralik River: Supports spawning populations of chinook, coho, sockeye, and chum salmon. Impacts from gold mining have occurred in some upper tributaries. Level of effect on salmon spawning and rearing habitat unknown.

Tuluksak River: Supports spawning populations of chinook, coho, and chum salmon. This was a very productive system prior to mining. The upper main stem and major tributaries have been heavily impacted by gold mining from early the 1900's through the 1980's. Twenty miles, or more, of salmon spawning and rearing habitat was severely damaged. It is reasonable to estimate that at least half of the salmon production of this river has been destroyed. Productivity of salmon in this area is reduced by inadequate stream flow in the main channel as water dissipates through tailings. The Tuluksak River would benefit greatly from restoration.

Aniak River: Supports spawning populations of chinook salmon, chum salmon, and coho salmon. Tributaries to the Aniak River have been placer mined since the early 1900's. The effect of this mining on salmon habitat is unknown.

Holitsna River: Supports spawning chinook, chum, coho, pink and sockeye salmon. Tributaries to the Holitsna have been mined since the early 1900's. The effect on salmon spawning and rearing has not been assessed.

Owhat River: Supports spawning chum salmon. Mining probably occurred in this drainage. The extent and effect is unknown.

Crooked Creek: Supports spawning populations of chinook, coho, and chum salmon. Tributaries to Crooked Creek were placer mined from the early 1920's to the present. The extent and effect of mining on Crooked Creek fish habitat has not been evaluated. The Crooked Creek drainage also contains major mineral deposits that are being evaluated for a potential open pit gold mine.

George River: Supports spawning populations of chinook, coho, chum, pink, and sockeye salmon. Tributaries to the George River have been placer mined from the early 1900's to the 1980's. Salmon producing habitat was damaged and some tributaries would benefit from restoration.

Takotna River: Supports spawning populations of chinook, coho and chum salmon. Tributaries to the Takotna River have been placer mined from the early 1900's to the present. Salmon producing habitat was damaged and some tributaries would probably benefit from restoration.

There are several highly mineralized areas in the Kuskokwim drainage, including the Taylor Mountain area, Crooked Creek Area, and much of the upper drainage. There has been a lot of historic placer mining throughout the drainage. Gold concentrations at Donlin Creek and several other areas are several times the levels currently being mined in the Fairbanks area, but development has been hampered by the lack of a cheap energy source and transportation infrastructure.

There has also been mercury mining near Red Devil and placer mining on some tributaries upstream from McGrath such as the Takotna and the Nixon Fork. There is some indication that some streams in highly mineralized areas in the Kuskokwim drainage may contain naturally high levels of metals, such as mercury, which could limit fish production in some systems. This phenomenon has been investigated because of the human health ramifications, but the potential effect on fish production has probably not been evaluated.

Logging

Rights to all of the timber on village corporation lands in the middle and upper Kuskokwim drainage were sold to a large timber corporation, which was considering logging the timber and rafting it down the Kuskokwim to log ships at the mouth. Most of this timber is located in the riparian areas along the major rivers and rafting it is expected to scour the bottom in some areas as well as damage additional riparian habitat. Low

timber prices may have caused those plans to fall through, but this may be a fisheries issue in the future.

Projects Needed

1. A comprehensive survey of anadromous fish habitat and problems using the advanced fish habitat identification program developed by the Habitat and Restoration Division.
2. Development of a fish information database for the Kuskokwim drainage using the ARC/INFO SEA/SIMS program that will be developed for S.E. Alaska.
3. Restoration of the Tuluksak River system which has been heavily impacted by mining.

Do New Or Expanding Fisheries On This Stock Exist?

There are no new or expanding fisheries on this stock. Ten proposals are before the Board (#'s 134, 135, 136, 137, 138, 139, 140, 141, 142 and 143) which could affect the harvest or management of this stock of concern.

Existing Management Plan and Proposed Modifications

In response to the guidelines established in the Sustainable Salmon Fisheries Policy, the Board requested that the department provide recommended changes to the existing Kuskokwim River Salmon Management Plan regarding the management of mixed species during the November 4-6, 2000 work session. Proposed regulatory language is as follows:

5 AAC 07.365. KUSKOKIWM RIVER SALMON MANAGEMENT PLAN. (a) The objective of the Kuskokwim River Salmon Management Plan is to provide guidelines for the management of the Kuskokwim River commercial salmon fishery which will result in sustained yields of the salmon stocks large enough to provide for subsistence needs and an economically viable commercial fishery.

(b) It is the intent of the Board of Fisheries that the Kuskokwim River king salmon stocks be managed in a conservative manner consistent with sustained yield principles and the subsistence priority and, consistent with this intent, that the available surpluses of other salmon be taken. To accomplish these objectives, the department shall manage the Kuskokwim River commercial salmon fishery as follows:

(1) there may not be a directed commercial king salmon fishery;

(2) repealed 6/14/90;

(3) only those waters of District 1 downstream of ADF&G regulatory markers located at Bethel may be open during the first fishing period;

(4) ~~there must be at least three eight hour fishing periods in June;~~

(5) although no directed fishery on king salmon is allowed, the incidental catch guideline harvest level for king salmon taken during fisheries directed on other species is ~~15,000~~ to 50,000 fish;

(6) to the extent possible, the department shall provide at least 24 hours' advance notice of the opening of District 1 and District 2 fishing periods;

(7) District 1 and District 2 fishing periods are from 1:00 p.m. until 7:00 p.m.; when longer periods are allowed, the extra time is to be divided before 1:00 p.m. and after 7:00 p.m.

(8) In June and until coho salmon abundance exceeds chum salmon abundance, the department shall manage, to the extent possible, the commercial salmon fishery based on the strength of the chum salmon run.

(9) The harvest of sockeye salmon will be considered incidental to the chum salmon directed fishery.

(10) When coho salmon abundance exceeds chum salmon abundance, the department shall manage, to the extent possible, the commercial salmon fishery based on the strength of the coho salmon run.

(11) When the chum salmon return is projected to be inadequate to meet escapement and subsistence needs, the department shall manage the coho salmon fishery to minimize the incidental harvest of chum salmon.

Escapement Goal Review

Although there are many new and recently established escapement projects within the Kuskokwim drainage, there are few with sufficient historical data available concerning chinook salmon stocks. No escapement goal analysis will be completed at this time. The department recommends that two previously established goals be dropped, because of the small number of fish spawning in these streams. This will allow the department to concentrate aerial surveys on larger spawning systems. Remaining goals will be classified as "preliminary Sustained Escapement Goals".

List of Current and Proposed BEG, or SEG for Stock

Stream	Current Goal	Proposed Goal
Kwethluk River/Canyon Creek - Aerial	1,200 BEG	1,200 SEG
Kisaralik River - Aerial	1,000 BEG	1,000 SEG
Kasigluk River – Aerial	100 BEG	discontinue
Tuluksak River – Aerial	400 BEG	discontinue
Aniak River drainage		
Aniak River – Aerial	1,500 BEG	1,500 SEG
Salmon River – Aerial	600 BEG	600 SEG
Holitna River drainage		
Holitna River – Aerial	2,000 BEG	2,000 SEG
Kogrukluk River Weir	10,000 BEG	10,000 SEG
Salmon River (Pitka Fork) - Aerial	1,300 BEG	1,300 SEG

Identify Research on Kuskokwim River Chinook Stock

List of Past Research On Kuskokwim River Chinook Salmon

Project Name	Years	Location	Primary Objective(s)
Kwegoyuk Test Fishery	66-83	Kuskokwim River, mile 26	Index chinook, chum, sockeye and coho salmon run timing and abundance using set gillnets
Eek Test Fishery	88-94	Kuskokwim River, mile 24	Index chinook, chum, sockeye and coho salmon run timing and abundance using drift gillnets
Lower Kuskokwim River Test Fishery	95	Kuskokwim River, mile 24 and 35	Index chinook, chum, sockeye and coho salmon run timing and abundance using drift gillnets
Aniak Test Fishery	92-95	Kuskokwim River, mile 225	Index chinook, chum, sockeye and coho salmon run timing and abundance using drift gillnets
Chuathbaluk Test Fishery	92-93	Kuskokwim River, mile 233	Index chinook, chum, sockeye and coho salmon run timing and abundance using drift gillnets
Kuskokwim River Subsistence Test Fishery	88-90	Lower and Middle Kuskokwim River	Determine catch per unit effort of salmon by selected subsistence fishers inseason
Kuskokwim River Sonar	93-95	Kuskokwim River, mile 79	Estimate passage of salmon by species using side-scan sonar
Kwethluk River Weir/Tower	91 (weir) 96-98	Kwethluk River, mile 50	Estimate escapement and age, sex, and size (ASL) composition of salmon into the Kwethluk River
Tuluksak River Weir	91-94	Tuluksak River, mile 48	Estimate escapement and ASL composition of salmon into the Tuluksak River
Kogrukluk River Tower	69-78	Kogrukluk River, mile 5	Estimate escapement and ASL composition of salmon into the Kogrukluk River
Takotna River Tower	95-98	Takotna River, mile 45	Estimate escapement of salmon into the Takotna River
Salmon River Weir	81-82	Salmon River/Pitka Fork, mile 3	Estimate escapement and ASL composition of salmon into the Salmon River
Kuskokwim River Tagging Studies	61-63 66	Kuskokwim River	Estimate migratory timing of salmon
Kuskokwim River Genetic Stock Identification	90-96	Kuskokwim River drainage	Determine genetic composition of chinook and chum salmon stocks in various Kuskokwim River tributaries

List of Present Research On Kuskokwim River Chinook Salmon

Project Name	Location / Start-up	Primary Objective(s)
Commercial Harvest and Effort Assessment	Kuskokwim River Districts W-1 & 2	Document and estimate harvest and associated effort of Kuskokwim River commercial salmon fishery
Commercial Harvest Sampling and Monitoring	Kuskokwim River Districts W-1 & 2	Determine age, sex, and size of salmon harvested in Kuskokwim River commercial fisheries; monitor commercial fishery openings and closures
Subsistence Harvest Assessment	Kuskokwim River drainage	Document and estimate the subsistence harvest and effort of the Kuskokwim River drainage subsistence salmon fishery via household surveys
Sport Catch, Harvest, and Effort Assessment	Kuskokwim River drainage	Document and estimate the catch, harvest, and associated effort of the Kuskokwim River sport fishery via post-season, mail-out questionnaires
Aerial Surveys	Kuskokwim River tributaries	Index the relative abundance of salmon spawning escapements by aerial surveys of selected tributary salmon spawning populations
Bethel Drift Gillnet Test Fishery	Kuskokwim River, mile 79; began 1984	Index chinook, chum, sockeye, and coho salmon run timing and abundance using drift gillnets
Kwethluk River Weir	Kwethluk River, mile 50; restarted 2000	Estimate daily escapement of salmon into the Kwethluk River; estimate ASL composition of chinook, chum, and coho salmon escapement
Aniak River Sonar	Aniak River, mile 11; began 1980	Estimate daily fish passage into the Aniak River; estimate ASL composition of chum salmon escapement
George River Weir	George River, mile 4; began 1996	Estimate daily escapement of salmon into the George River; estimate ASL composition of chinook, chum, and coho salmon escapement
Kogrukuk River Weir	Kogrukuk River, mile 1; began 1976	Estimate daily escapement of salmon into the Kogrukuk River; estimate ASL composition of chinook, chum, and coho salmon escapement
Tatlawiksuk River Weir	Tatlawiksuk River, mile 2; began 1998	Estimate daily escapement of salmon into the Tatlawiksuk River; estimate ASL composition of chinook, chum, and coho salmon escapement
Takotna River Weir	Takotna River, mile 45; began 2000	Estimate daily escapement of salmon into the Takotna River; estimate ASL composition of chinook, chum, and coho salmon escapement

List of Proposed Research On Kuskokwim River Chinook Salmon

Project Name	Location	Primary Objective(s)
Kuskokwim River Chinook and Coho Salmon Genetic Baseline	Kuskokwim River drainage	Determine genetic composition of chinook and coho salmon stocks in various Kuskokwim River tributaries
Inseason Subsistence Harvest Monitoring	Kuskokwim River (McGrath, Aniak and Bethel areas)	Determine progress and relative success of subsistence fishing inseason; estimate ASL composition of chinook salmon harvested by the fishery
Kuskokwim River Sonar	Kuskokwim River, mile 91	Estimate passage of salmon by species using side-scan sonar
Tuluksak River Weir	Tuluksak River, ~mile 40	Estimate daily escapement of salmon into the Tuluksak River; estimate ASL composition of chinook, chum, and coho salmon escapement
Additional Weirs	Various Rivers	Estimate daily escapement of salmon into the selected rivers; estimate ASL composition of chinook, chum, and coho salmon escapement
Database Development Project	Kuskokwim River	Inventory and integrate complete complement of historical salmon abundance and ASL data to support the process of determining data shortfalls and needs, and to enhance access to historic data for inseason management purposes.
Kuskokwim River Tributary Weir Site Surveys	Kuskokwim River tributaries	Survey selected Kuskokwim River tributaries to identify sites where salmon counting weirs can be installed and operated.
Holitna River Radio-telemetry Tagging Study	Holitna River drainage	Estimate spawning distribution and total escapement of chinook and coho salmon in the Holitna River drainage
Aniak River Subsistence Fishery Study	Aniak River drainage	Determine level of subsistence use for the Aniak River drainage, harvest estimates for all fish species, gather traditional ecological knowledge from residents using the river
Effects of Propeller- and Jet- Driven Boats on Spawning Salmon in the Aniak River	Aniak River	Determine effects of boat traffic on spawning salmon and salmon eggs in the Aniak River
Survey of Sport Fishing in the Aniak River	Aniak River drainage	Estimate sport effort, catch, and harvest of salmon and resident species in the Aniak River drainage

Kuskokwim River Salmon Research Plan

The following statements of goals and objectives provide the basis of a research plan to address the most significant concerns associated with managing chinook and chum salmon fisheries in the Kuskokwim River drainage. The five goals in the research plan incorporate principles of the Sustainable Salmon Fisheries Policy. Research needs and priorities are articulated as objectives. Difficulties to achieving objectives are outlined, and projects and actions to address or overcome the difficulties are identified.

DRAFT

Goals	Objectives
1. Maintain wild salmon stock escapements within ranges to sustain salmon production, diversity and normal ecosystem functioning	1a. Establish BEG for drainage 1b. Establish SEG for tributaries where appropriate 1c. Establish acceptable standards for escapement quality
2. Harvest with caution commensurate with uncertainty	2a. Manage escapement for the drainage 2b. Incorporate system productivity into management decisions 2c. Evaluate the effects of enhanced stocks on wild stocks 2d. Rebuild depleted stocks 2e. Understand sources of mortality and exploitation of stocks in fisheries 2f. Evaluate management systems 2g. Develop reliable forecasting tools 2h. Evaluate enforcement for effectiveness
3. Protect marine, coastal and watershed habitat for wild salmon migration, spawning and rearing	3a. Identify critical habitat 3b. Characterize critical habitat and understand variability 3c. Monitor habitat for change 3d. Evaluate habitat management and enforcement for effectiveness 3e. Restore degraded habitat if warranted
4. Promote public support and involvement for sustained use and protection of salmon resources	4a. Distribute information about the planning effort to build public support 4b. Develop field research projects with public involvement 4c. Continued public involvement in salmon working group
5. Consider net social and economic benefits from the fisheries to users	5a. Assess the impact of management decisions on socioeconomic benefits 5b. Derive local benefits for development and use of Kuskokwim fisheries 5c. Evaluate long term viability of fisheries to promote economic health

ACTION PLAN DEVELOPMENT

Kuskokwim River Chinook Salmon Rebuilding Action Plan Goal

Reduce fishing mortality in order to meet spawning escapement goals, to provide for subsistence levels within the ANS range, and to reestablish historic range of harvest levels by other users.

Action Plan Alternatives – Kuskokwim River

ACTION #1

Amend 5AAC 07.365(b)(4) to delete the requirement that there be at least three eight-hour periods in June:

Objective

The objective of this action is to bring the management plan into consistency with current management practices which open commercial fishing periods based on the strength of the chum salmon run and opportunities for subsistence fishers to harvest salmon necessary for subsistence.

Specific action recommended to implement the objective

Amend the existing regulation to delete the requirement.

Subsistence issues/considerations

The requirement that there be three eight-hour commercial fishing periods in June could result in reduced subsistence fishing opportunity. The recommended action is consistent with state subsistence law requirements. Basing the commercial fishing periods on the timing and strength of the chum salmon run while minimizing the incidental harvest of chinook salmon in the commercial fishery will continue to provide an opportunity for subsistence fishing.

Performance measures

Since this regulation was adopted, chum salmon run strength has not been sufficient to allow for three eight-hour fishing periods in June and still provide for escapement and subsistence needs. The amount of commercial fishing time in June varies each year based on chum and chinook salmon run strength. Likewise, the amount of subsistence fishing closures each June is greater during years when there are commercial fishing openings. Inseason chum salmon run assessment will be based on test fisheries, subsistence catch reports, age and sex composition, and preliminary escapement monitoring information. The department will participate in Kuskokwim River Salmon Management Working Group meetings inseason to gather information from the public and to discuss run status and management actions.

Research plan to address stock of concern

A research plan may be developed if applicable, should the Board accept this action.

ACTION #2

When very low chinook salmon runs are projected and commercial fishing is likely to remain closed, reduce subsistence fishing time early in the run to help ensure that subsistence harvests do not impair meeting escapement needs or reasonable opportunity for all subsistence users.

Objectives

Reduce subsistence harvests early in the season when there is a much higher level of uncertainty in projecting total run abundance and spread subsistence fishing opportunity among users.

Specific action recommended to implement the objective

Through involvement with the Kuskokwim River Salmon Management Working Group and other members of the public, the department would identify times and areas when closures to the subsistence fishery are most appropriate. To spread harvest opportunity among all subsistence users, management of the subsistence fishery would use time and/or area and gear restrictions to provide for opportunity throughout the drainage while allowing chinook salmon to pass through the districts and meet escapement goals. The department would establish subsistence fishing periods, and implement gear restrictions by emergency order based upon inseason run assessment and reasonable opportunity as developed through the Board and public process. If subsistence restrictions are implemented, they could be easily modified as necessary based on changes in the strength or timing of the salmon run.

Benefits

Salmon run outlooks in the Kuskokwim River are qualitative in nature and based on parent year spawning escapements, age composition information, and recent trends in run strength. While the harvest outlooks provide for a general level of expectation, the fisheries are managed based upon inseason assessments of run strength. When a very poor run is projected and commercial fishing is likely to be closed, there is the potential that typical subsistence harvests may not provide for adequate spawning escapements. Additionally, during years when there are no commercial fishing openings, subsistence opportunity is increased due to the lack of subsistence closures associated with commercial fishing periods. In a year with average run strength, there are usually two commercial periods per week, which allows for approximately five days of subsistence fishing a week. If this action is accepted, the length of the subsistence fishing periods would vary depending on salmon run strength and other factors. Closing subsistence fishing on weekends would probably have least impact on 'full-time' subsistence fishers. Managing the subsistence fishery using the Kuskokwim River Salmon Management

Working Group and the public in an advisory capacity would provide the flexibility necessary to react in a timely manner to inseason run assessment information.

Detriments

Currently subsistence harvest levels cannot be determined inseason. Closure or restrictions to the subsistence fishery early in the season could be overly restrictive or too lenient prior to obtaining complete run abundance information. Subsistence fishers could forego some harvestable surplus that was not identified until it had already passed through their area or conversely, they may harvest fish needed for escapement. If subsistence fishing closures are lengthy, resulting in short (less than 36 hours) subsistence fishing openings, individuals, particularly older fishers using **set** nets, would be repeatedly setting, removing and resetting their nets. There could be increased competition for a limited number of good setnet sites. Setnet fishers who traditionally occupy the same location every year could lose the site once their net was removed.

Subsistence issues/considerations

Reduction of subsistence fishing time may result in reduced fishing opportunity, which may decrease the ability of some subsistence users to meet their needs. Having short open and closed periods would most impact fishers who use set nets to harvest their fish.

Performance measures

The department encourages fishermen to keep track of their subsistence salmon harvests on household subsistence catch calendars. Harvest levels would be determined through postseason subsistence surveys. A postseason analysis of subsistence **salmon** harvests will be conducted to determine if the objective of spreading reasonable opportunity among all subsistence users was achieved. Inseason chinook salmon run assessment will be based on test fisheries, subsistence catch reports, age and sex composition, and preliminary escapement monitoring information. Although it will be difficult to measure the degree to which subsistence restrictions contributed to achieving actual escapement goals, it can be expected that escapements would have been lower had these restrictions not been in place.

Research plan to address stock of concern

Information needs include increased escapement monitoring and inseason subsistence harvest monitoring.

ACTION #3

Provide Department authority to restrict subsistence harvest of salmon to gillnets of 6-inch mesh or smaller by emergency order when necessary to reduce harvest rate on chinook salmon and provide opportunity to harvest other salmon.

Objective

The purpose of this action is to reduce the harvest of large, female chinook salmon to provide for adequate spawning escapement while allowing the harvest of other species for subsistence needs.

Specific action recommended to implement the objective

During times when the commissioner determines it to be necessary for the conservation of chinook salmon, the commissioner, by emergency order, may close the fishing season in the Kuskokwim Area and immediately reopen the season in that area during which a six-inch or less mesh gillnet gear limitation apply.

Benefits

When a low chinook salmon run is projected and commercial fishing is likely to be closed, there is the potential that there may not be adequate numbers of chinook salmon necessary to provide for subsistence needs and for adequate spawning escapements. If a harvestable surplus of chum and/or sockeye salmon was identified, a reduction in subsistence gillnet mesh size could allow opportunities to harvest chum and sockeye salmon while conserving the larger chinook salmon.

Current subsistence regulations allow subsistence gear limitations when the commissioner determines it to be necessary for the conservation of chum salmon. The recommended action would extend this management tool to chinook salmon.

Detriments

This would not be a viable tool to use when there are concurrent very poor chinook and chum salmon runs. Subsistence harvest levels cannot be determined inseason. Management of the subsistence fishery could be overly restrictive or too lenient prior to obtaining complete run abundance information. Subsistence fishers could be required to forego a surplus that was not identified until it had already passed through their area.

Subsistence fishermen who do not have six-inch mesh gillnets would have to purchase or borrow gillnets or be unable to participate in the restricted mesh fishery.

Subsistence issues/considerations

Restricting gillnet mesh sizes to 6-inches or smaller would reduce subsistence users' harvest rates for large chinook salmon and would increase their harvest rates for small chinook, and other salmon.

Performance measures

The department encourages fishermen to keep track of their subsistence salmon harvest on household subsistence catch calendars. Harvest levels would be determined through postseason subsistence surveys. A postseason analysis of subsistence salmon harvests and escapement monitoring projects will be conducted to determine if the objective was achieved. Inseason chinook salmon run assessment will be based on lower river test fisheries, subsistence catch reports, age and sex composition, and preliminary escapement monitoring information. The department will participate in Kuskokwim River Salmon Management Working Group meetings inseason to gather information from the public and to discuss run status and management actions.

Research plan to address stock of concern

A research plan may be developed if applicable, should the Board accept this action.

ACTION #4

Provide the department authority to change bag limits for subsistence rod and reel fisheries by emergency order when necessary to help ensure that subsistence harvests do not impair meeting escapement needs (Related proposals 134 and 135).

Objective

Reduce the potential total harvest of chinook salmon in tributary streams to provide for adequate spawning escapement while allowing the harvest of other species for subsistence needs.

Specific action recommended to implement the objective

Emergency order authority to limit the harvest of chinook salmon by subsistence fishers using a rod and reel (line attached to a rod or pole) would enable the department to adjust subsistence bag limits to meet specific conservation needs. This emergency order authority would be used when and where a need to conserve chinook salmon is identified. This authority should also allow for setting length limits for harvested fish to allow retention of smaller, male chinook salmon and require release of larger chinook salmon. Authority to regulate tackle (e.g. no bait, single hook lures, etc.) should also be considered in order to allow for capture methods that would allow for increased survival of released chinook salmon.

Benefits

This action would provide added protection for chinook salmon on the spawning grounds. Presently, there are no limits on the subsistence harvest of salmon by rod and reel. If the character of the subsistence rod and reel fishery changes significantly, there is a potential for the chinook salmon harvest by rod and reel to increase. Fishing for chinook salmon with rod and reel gear occurs primarily in the spawning tributaries. By the time chinook salmon reach the spawning tributaries, they are already through the primary gillnet fishery. The potential harvest of chinook salmon on the spawning grounds by rod and reel gear will be reduced.

Detriments

Subsistence users that harvest a significant portion of their chinook salmon using rod and reel may not have a viable alternative method to harvest chinook salmon. A limited harvest of small, male chinook salmon may not be adequate to meet these subsistence users needs. Subsistence fishers may find it inappropriate to release fish that they catch. Complex regulations that disallow the use of bait and treble hooks in some drainages and not others and limits to the size of chinook that can be harvested may result in uncertainties and misunderstandings about subsistence fishing regulations.

Subsistence issues/considerations

See above paragraph.

Performance measures

The department encourages fishermen to keep track of their subsistence salmon harvest on household subsistence catch calendars. A postseason analysis of subsistence salmon harvests and escapement monitoring projects will be conducted to determine if the objective was achieved. Subsistence fishers will be asked if they harvested salmon with rod and reel gear and if so, the species and number of salmon harvested. Inseason chinook salmon run assessment will be based on test fisheries, subsistence catch reports, age and sex composition, and preliminary escapement monitoring information. The department will participate in Kuskokwim River Salmon Management Working Group meetings inseason to gather information from the public and to discuss run status and management actions.

Research plan to address stock of concern

A research plan may be developed if applicable, should the Board accept this action.

ACTION #5

When very low runs are projected, determine when commercial and sport fisheries are closed in relation to one another.

Objective

This action integrates management of the Kuskokwim River drainage sport fishery into the Kuskokwim River Salmon Management Plan. The measure develops a policy or regulation under which certain actions taken in regards to the commercial fishery would result in appropriate actions in the sport fishery.

Specific action recommended to implement the objective

Take appropriate action to limit sport fish harvest (reduce bag limits, catch and release, or closure) of chinook salmon when the commercial fishery is closed to conserve chinook salmon. An appropriate action could depend on whether commercial fishing is closed for an extended period of time or for the season.

Benefits

The general public, sport fishers, and sport fishing guides would benefit if there was a policy or regulation that addressed what conservation actions would occur in the sport fishery based on conservation actions taken in the commercial fishery.

Detriments

Sport fishing guides could be adversely effected if their ability to attract clients is diminished by closure or restriction of sport fishing opportunities.

Subsistence issues/considerations

Failure to restrict the sport fishery concurrent with the subsistence fishery would likely result in substantial negative public opinion; however, the estimated average sport harvest of chinook salmon is only 816 fish for the entire Kuskokwim River drainage. Catch rates for chinook salmon in the sport fishery are much higher, but the fish are typically released so the harvest rate is low.

Performance measures

The department collects data on sport fish effort and harvest using various survey techniques. Sport fish effort, catch and harvest estimates are generated for streams from which significant data are collected. The department routinely contacts sport fishers, sport fish guides and other members of the public inseason to solicit their input concerning the sport fishery. The department will participate in Kuskokwim River Salmon Management Working Group meetings inseason to gather information from the public and to discuss run status and management actions.

Research plan to address stock of concern

A research plan may be developed if applicable, should the Board accept this action.

ACTION #6

Adopt regulations creating a Tier II subsistence fishery and Tier II permit scoring system for the stock of concern, or segments of a stock of concern, when there is a chronic inability of subsistence harvests to meet the Amount Necessary for Subsistence (ANS) range established by the Board. A "chronic inability" means the continuing or anticipated inability to meet the ANS range over a four to five year period, which is approximately equivalent to the generation time of most salmon species.

Objectives

To create a Tier II system consistent with the sustainable fisheries policy and AS 16.05.258(b)(4), when the harvestable portion of the stock is not sufficient to provide a reasonable opportunity for subsistence uses.

Specific Action Recommended to Implement the Objective

The language of the action option may be included as a provision of a management plan. When the threshold conditions are met, the department will bring to the board options for

a Tier II system. Proposals from the public requesting Tier II management may require provisions be developed and implemented before the threshold conditions are met.

Benefits

The action creates a process for the development of Tier II system when consistently poor subsistence harvests have occurred. The Tier II system may be tailored to the stock of concern, with input by the public during a noticed board meeting. Clear, measurable conditions for consideration and initiation of Tier II provisions allows the public time to discuss and develop effective Tier II factors to ensure compliance with statutory criteria.

Detriments

Failure to achieve harvest levels within the ANS range may involve other factors that are unrelated to low run abundance. Examples of factors effecting subsistence harvest may include: river conditions affecting harvest efficiency; changes in employment (eg. fire fighting); owner of a large dog lot moves or gets rid of his dogs; changes in the reporting of subsistence harvests. It should be clearly established that the chronic inability to meet the ANS range is primarily due to poor salmon runs.

There may be a time lag between the development and implementation of Tier II regulations, during which opportunity by all subsistence users are restricted, rather than distinguishing among subsistence users based on statutory criteria.

Research plan to address stock of concern

A research plan may be developed if applicable, should the Board accept this action.

Action Plan Alternatives – District W-4, Quinhagak

ACTION #1

When preseason run projections for Kuskokwim River chinook salmon indicate that subsistence fishing restrictions may be required to conserve chinook salmon, the boundaries of District W-4 will be reduced to lower the potential harvest of Kuskokwim River chinook salmon.

Objectives

This action is intended to decrease the potential harvest of Kuskokwim River chinook salmon stocks by the District W-4 commercial fishery.

Specific action recommended to implement the objective

Move the northern boundary of District W-4, south to a point between the mouth of Oyak Creek and the Kanekiook River.

Benefits

The number of Kuskokwim River chinook salmon being harvested in the District W-4 fishery may be reduced by an unknown amount. A tagging study conducted in District W-4 in 1969-70 showed the presence of Kuskokwim River chinook salmon stocks in the W-4 fishery, but the information is not adequate for determining the proportion of Kuskokwim River fish present in that fishery. Moving the W-4 boundary south would redistribute the W-4 fleet and place fishers farther from the Kuskowkim River. This action may reduce the interception of fish bound for the Kuskokwim River, but it assumes that chinook salmon caught near the northern boundary of District W-4 have a higher proportion of Kuskokwim River fish than fish caught farther south. This assumption has not been verified. The 1969-70 tagging study occurred between June 24 and July 11, and all salmon tagged were within 500 yards of the Kanektok River. Fleet distribution information collected from aerial surveys from 1997 to 2000 show that about 80% of the W-4 fishing effort occurred within 2 miles of the Kanektok River mouth. About 11% of the effort was observed north of Oyak Creek which is located 3 miles north of the Kanektok River.

Detriments

District W-4 fishers would have a reduced fishing area, causing increased crowding and competition for preferred fishing sites. Harvest of all salmon species may be reduced depending on fish distribution and the amount of crowding that occurs.

Subsistence issues/considerations

Reducing the boundaries of District W-4 would probably have no effect on the subsistence harvest in District W-4. The effect on escapement and subsistence harvest in the Kuskokwim River is unknown, but presumably the action would be beneficial.

Performance measures

Currently, the department is unable to quantify any possible reduction in the number of Kuskokwim River chinook salmon taken in District W-4 due to a boundary reduction.

Research plan to address stock of concern

To determine the proportion of chinook salmon present in District W-4 by river of origin would require either a tagging study specifically designed for that purpose or, if feasible, a stock identification study using genetic markers, scale pattern analysis or some other method. Research studies proposed for the summer of 2001 include additional sampling in the Kuskokwim Area to develop the chinook genetic baseline.

ACTION #2

When preseason run projections for Kuskokwim River chinook salmon indicate that subsistence fishing restrictions may be required, the number, and/or length, of commercial openings in District W-4 will be reduced to lower the potential harvest of Kuskokwim River chinook salmon.

Objectives

The objective of this action is to decrease the potential harvest of Kuskokwim River chinook salmon stocks by the District W-4 commercial fishery when very poor runs are anticipated.

Specific Action Recommended To Implement The Objective

Reduce commercial fishing time in District W-4 by one of the following means: 1) reducing the number of fishing periods per week during the chinook salmon fishery, 2) delaying the opening of the season, or 3) reducing the length of fishing periods during the chinook salmon fishery.

Benefits

The number of Kuskokwim River chinook salmon harvested in the District W-4 fishery may be reduced, but the amount is unknown. Under the District W-4 Salmon Management Plan, commercial fishing must open before June 16. The normal fishing schedule in District W-4 is two 12-hour periods per week during the chinook salmon fishery, which primarily occurs in June and three 12-hour periods per week during the sockeye salmon fishery, which primarily occurs in July. Based on the Bethel test fishery, approximately 26% of the Kuskokwim River chinook salmon run has passed Bethel by June 16, 50% by June 22, and 75% by June 28. It is likely that few Kuskokwim River chinook would remain in District W-4 waters after June 28. Reducing the number of fishing periods by one period per week, prior to June 28, could reduce the harvest of Kuskokwim River chinook salmon by up to 50%. Delaying the start of the District W-4 commercial fishery may also allow for a higher proportion of Kuskokwim River chinook salmon to pass through the district. Based on the run timing at Bethel, it appears a delay in the opening by six days would reduce the Kuskokwim River chinook harvest in District W-4 by up to 25%. Scheduling fishing periods to coincide with the time of high tide, would allow fishers to fish closer to the mouth of W-4 streams, possibly reducing the number of Kuskokwim River chinook salmon harvested. It is not possible to quantify the savings of Kuskokwim River chinook salmon achieved by shortening fishing periods.

Detriments

Reduced fishing time would result in loss of harvest in W-4 of stocks migrating to drainages within the district, which are not stocks of concern. Reducing commercial fishing time by 50% prior to June 28 would probably result in a reduction in harvest within the district of approximately 33% for chinook salmon, eight percent for chum salmon, and five percent for sockeye salmon. Delaying the season opening until June 22 (six days) would probably result in a reduction in harvest for the district of approximately 42% for chinook salmon, six percent for chum salmon, and three percent for sockeye salmon. Delaying the season until June 28 would probably result in a reduction in harvest within the district of approximately 67% for chinook salmon, 16% for chum salmon, and 11% for sockeye salmon. Shortening periods may cause effort levels to drop, especially if fishers find that the cost to travel to the district becomes prohibitive due to lowered harvest per trip. Fishing periods in W-4 are 12 hours long in order to insure that a whole flood tide is available for fishing when fish are more likely to be moving toward river mouths and fishing can occur closer to the river mouth. If shorter

(e.g. 6-hour) fishing periods do not include a good portion of the flood tide, a significant decrease in harvest could occur. Presently fishing periods begin at 9:00 am and end at 9:00 pm. If shorter periods are scheduled to take advantage of flood tides, the period's starting and ending times will not be fixed as they are presently. This will cause confusion among fishers who are accustomed to fishing periods with fixed starting and ending times.

Subsistence issues/considerations

Reducing commercial fishing time in District W-4 would provide more subsistence fishing time in District W-4. The effect on escapement and subsistence harvest in the Kuskokwim River is unknown, but presumably positive.

Performance measures

Currently, the department is unable to quantify any reduction in the number of Kuskokwim River chinook salmon taken in District W-4 due to a reduction in fishing time.

Research plan to address stock of concern

To determine the proportion of chinook salmon present in District W-4 by river of origin would require either a tagging study specifically designed for that purpose or, if feasible, a stock identification study using genetic stock identification, scale pattern analysis or some other method. Research studies proposed for the summer of 2001 include additional sampling in the Kuskokwim Area in the hope that a finer resolution can be determined.